REMARKS

Claims 1-33 remain pending. Claims 1-3, 6-12, 14, 15, 18 and 19 have been amended. New claims 32 and 33 have been added. The claim amendments and new claims contain no new matter and are supported, for example, by page 10, paragraphs 21-22, and page 11, paragraph 25, among other places. New claims 32 and 33 are also supported, for example, by page 5, paragraph 15, among other places.

The Examiner has rejected claims 1-31, including independent claims 1, 14, 15, 18 and 19, under 35 U.S.C. § 103(a) as being unpatentable over the combination of U.S. 6,429,930 by Littau et al. (referred to herein as Littau) and U.S. 6,650,422 by Singh et al. (referred to herein as Singh.)

The Examiner rejected claims 14, 15 and 18 under 35 U.S.C. § 101 because the claimed invention is allegedly directed to non-statutory subject matter. The Examiner's rejections are respectfully traversed as follows.

Claim 1 is directed towards a method. Claim 1 recites "obtaining scatterometry signals by performing scatterometry measurements on a plurality of grating structures with different process responses, each grating structure having a first grating parameter and the grating structures having different values for the first grating parameter." Claim 1 further recites "comparing scatterometry signals from said different grating structures in order to ascertain information about one or more process parameters used to form said grating structures." Claim 1 also requires "controlling said one or more process parameters based on said comparison, wherein the differences between process responses are attributable at least in part to the differences between the different values for the first grating parameters and wherein the different values for the first grating parameters are selected so as to cause different process responses under the same process parameters."

Claim 14 recites a first and second grating structure with different first and second process responses, each of the grating structures producing different scatterometry signals for a given set of process parameters. Claim 14 further recites "wherein the first grating structure and the second grating structure each has a first grating parameter and wherein a first value of the first grating structure's first grating parameter differs from a second value of the second grating structure's first grating parameter and wherein the difference between the first process response and the second process response is attributable at least in part to the difference between the first value and the second value." Claim 15 recites "each target having a first parameter and the

plurality of targets having different values for the first parameter, wherein the differences in sensitivities are attributable at least in part to the differences between the different values and wherein the different values are selected so as to cause different process responses under the same process parameters." Claim 18 recites "each pattern having a first parameter and the measurable patterns having different values for the first parameter" and "the differences between the process responses are attributable at least in part to the differences between the different values and wherein the different values are selected so as to cause different process responses under the same process conditions." Claim 19 recites "each target having a first parameter, the plurality of scatterometry targets having different values for the first parameter" and "wherein the differences between the process responses is attributable at least in part to the differences between the different values and wherein the different values are selected so as to cause different process responses under the same process conditions."

To support his rejection of claims 1-31 under 35 U.S.C. § 103(a), the Examiner opined that Littau discloses obtaining and comparing scatterometry signals from grating structures with different process responses. In the previous reply, Applicants disagreed, stating that in Littau, "the diffraction gratings are formed from the same pattern, and thus they have the same response to a given set of process parameters." (See Amendment A, filed 12/27/2006, at page 8.)

In the most recent Office Action, the Examiner did not contradict this statement, but suggested that the claim allegedly did not cover the statement. Page 3 of the Office Action states, "Examiner is not arguing that the pattern used by Littau is different, but merely stating that by differing the exposure time and dosage between two diffraction gratings indeed will produce different process responses... Applicant has not defined in the claim what exactly a different process response is. Without a clear-cut definition, in the broadest sense of the term, a 'different process response' is exactly what Littau achieves by varying the exposure time and dosage of each diffraction grating."

Applicants respectfully traverse the Examiner's rejection, but in the interest of expediting prosecution, the independent claims have been amended merely for clarity purposes. For instance, claim 1 now recites that each grating structure has a first grating parameter and the grating structures have different values for the first grating parameter. Claim 1 further recites that the differences in process responses are attributable at least in part to the differences between the different values for the first grating parameters and that these different values are selected so as to cause different process responses under the same process parameters. The amendments of the remaining independent claims are outlined above.

In Littau, by contrast, the differences between the diffraction gratings are believed to stem entirely from the use of different process parameters (e.g., focus) and not from any other parameter, such as a grating parameter, in the manner claimed. Littau does not teach grating structures with a first grating parameter with different values for the first grating parameter. As stated in the previous Amendment, Littau does not use a different parameter value for each diffraction grating. The goal of Littau would not be served by such features, because Littau is concerned with isolating the effect of a process parameter (e.g. focus) on the formation of a diffraction grating so that the center of focus can be obtained. Column 3, lines 54-56 of Littau states that "[t]he method can further include forming the plurality of diffraction gratings utilizing the lithography device at different known focus settings." In column 9, lines 22-25 states that "[i]n a preferred embodiment, the diffraction grating set is composed of a series of different focus diffraction gratings, preferably varying by a known and incremental focus step, wherein all diffraction gratings are at a fixed dose." Once the diffraction gratings are created, diffraction signatures are obtained from the gratings and the center of focus is determined by tracking the incremental effect of different focus settings. Column 10, lines 60-65 states, "[t]he difference in diffraction signatures from one focus step to the next will become less and less as the center of focus is approached. Under theoretically ideal conditions, the center of focus is the point as which variation in diffraction signatures are at a minima."

Littau thus teaches against claims 1, 14, 15, 18 and 19, because it appears that Littau's technique for finding the center of focus would be hindered if the diffraction gratings in Littau incorporated different values for a first grating parameter, in the manner claimed. Changing values of the diffraction gratings, such as grating parameters, during the formation of each diffraction grating in Littau would make isolating the effect of focus difficult. Without such isolation, Applicants believe that the calculations of the center of focus in Littau would be less accurate.

In sum, Littau fails to teach or suggest grating structures with different values for a first grating parameter, where the different values are selected to cause different process responses under the same process parameters, in the manner claimed. The secondary reference Singh also fails to teach or suggest such feature. Accordingly, Applicants respectfully submit that independents claim 1, 14, 15, and 18 are patentable over the cited references.

The Examiner also rejected claims 14, 15 and 18 under 35 U.S.C. § 101 because the claimed invention is allegedly directed to non-statutory subject matter. The Examiner noted on page 4 of the Office Action that "although the claims appear useful and concrete, there does not appear to be a tangible result claimed... As such, the subject matter of the claims is not patent eligible."

Applicants respectfully submit that the subject matter of the claims is patentable and produces a tangible result. MPEP 2106 IV C 2 (b) states that the "[t]he tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. The same section refers to *Diehr*, 450 U.S. at 187, 209 USPQ at 8: "[A]n application of a law of nature or mathematical formula to a ... process may well be deserving of patent protection." The same section provides an excerpt from Corning, 56 U.S. (15 How.) at 268, 14 L.Ed. 683: "It is for the discovery or invention of some practical method or means of producing a beneficial result or effect, that a patent is granted..."

Applicants believe that this "beneficial result or effect" is provided in claims 14, 15 and 18 and the specification. Claim 14 recites "extracting information about one or more process parameters based on said comparison." Claim 15 recites "extracting optimal or best focus using the relationship." Claim 18 recites "extracting information about one or more process parameters associated with a photolithographic process." Page 9, paragraph 18 of the specification recites the following example uses of the present invention:

> "The general objective of the invention is to monitor, optimize and control photolithographic processes using scatterometry measurements and carefully designed measurement sites. The invention generally includes measuring two or more measurable patterns that are configured to produce different scatterometry signals. The differences between the signals are preferably due to one or more process parameters used to create the measurable patterns. The difference signals therefore can be monitored to determine the best process conditions for photolithographic process. For example, information about the process parameters can be extracted out of the difference signals since the differences are based at least partially on the process parameters." (Emphasis added.)

Page 11, paragraph 25 further states, "[i]n lithography, focus and exposure are two process parameters that have a great impact on patterning of devices and therefore monitoring and controlling focus and exposure is important."

Applicants believe that the above citations demonstrate that claims 14, 15 and 18 do more than merely recite mathematical algorithms or abstract concepts. The specification demonstrates that the extracting step as well as the other steps in the claims produce tangible, useful and concrete results for at least a photolithographic process. Accordingly, Applicant respectfully request that the rejection of claims 14, 15 and 18 under 35 U.S.C. § 101 be withdrawn.

Applicants believe that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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